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10/521,544	01/14/2005	Shiro Sakai	08228/071001	9344

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EXAMINER	
QUINTO, KEVIN V	

ART UNIT	PAPER NUMBER
2826	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/521,544	SAKAI ET AL.	
	Examiner	Art Unit	
	Kevin Quinto	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-11 and 13-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-11 and 13-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-5, 7-11, and 13-15 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 7, 8, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Sakai et al. (USPN 4,992,837) and further in view of Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1).

4. In reference to claim 1, Chang et al. (USPN 6,441,403 B1, hereinafter referred to as the "Chang" reference) discloses a structure which meets the claim. Chang discloses (claims 1-24, columns 6-8) a gallium nitride (GaN)-based compound semiconductor device having a GaN-based light emitting member with a buffer layer adjacent to a light emitting layer member which comprises a multilayer quantum well layer structure including an InGaN well layer and an AlInGaN barrier layer. Chang does not disclose the use of a strained layer superlattice clad layer. However the use of such

a layer is well known in the art. Sakai et al. (USPN 4,992,837, hereinafter referred to as the "Sakai" reference) discloses that a strained layer superlattice clad layer provides the benefits of proper lattice matching, excellent carrier confinement, and easy control of conductivity type (column 7, lines 7-11) which are all known goals in the art (column 2, lines 10-15). In view of Sakai, it would therefore be obvious to use a strained layer superlattice clad layer in the Chang device. Chang does not disclose the exact compositional ratio of aluminum or indium in the AlInGaN barrier layer or the exact wavelength as that claimed by the applicant. However Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1) discloses that adjusting the content of aluminum and indium in a group III nitride material in order to attain a desired bandgap is known in the art (p. 2, paragraph 25). Furthermore Edmond discloses that the wavelength of emitted light is function of the bandgap of the material (p. 1, paragraph 6). Thus Edmond makes it clear that the content of aluminum and indium in a group III nitride layer as well is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore this limitation is not patentably distinguishable over Chang, Sakai, and Edmond. As for the specific wavelength range required by the applicant, McIntosh et al. (USPN 5,684,309, hereinafter referred to as the "McIntosh" reference) makes it clear that the aluminum indium gallium nitride material system (the material system in Chang) possesses energy

bandgaps which can be tailored over wavelengths which range from the far ultraviolet to the red region of the electromagnetic spectrum (column 2, lines 7-13). It has been held that:

> "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Thus claim 1 is not patentable over Chang, Sakai, and Edmond.

5. In reference to claims 2 and 3, Chang does not disclose the exact compositional ratio of indium in the InGaN well layer. However Edmond (United States Patent Application Publication No. US 2002/0093020 A1) discloses that adjusting the content of aluminum and indium in a group III nitride material in order to attain a desired bandgap is known in the art (p. 2, paragraph 25). Furthermore Edmond discloses that the wavelength of emitted light is function of the bandgap of the material (p. 1, paragraph 6). Thus Edmond makes it clear that the content of aluminum and indium in a group III nitride layer as well is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore this limitation is not patentably distinguishable over Chang, Sakai, and Edmond.

6. In reference to claim 7, Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Edmond (United States Patent Application Publication No. US 2002/0093020 A1) discloses that adjusting the content of aluminum and indium

in a group III nitride material in order to attain a desired bandgap is known in the art (p. 2, paragraph 25). Furthermore Edmond discloses that the wavelength of emitted light is function of the bandgap of the material (p. 1, paragraph 6). Thus Edmond makes it clear that the content of aluminum and indium in a group III nitride layer as well is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore this limitation is not patentably distinguishable over Chang, Sakai, and Edmond.

7. With regard to claim 8, the buffer layer adjacent to the light emitting layer is an AlInGaN buffer layer.

8. In reference to claim 11, the examiner notes the limitation regarding the formation temperature of the InGaN and AlInGaN layers. However this places claim 11 into the form of a **product-by-process claim**:

> Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi* et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in " product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 11 does not patentably distinguish over the Chang reference regardless of the process used to form the InGaN and AlInGaN layers, because only the final product is

relevant, and not the process of making such as forming at a temperature greater than 750°C.

9. With regard to claim 13, Sakai discloses the use of an SLS n-clad layer in figure 5.

10. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Sakai et al. (USPN 4,992,837) and further in view of Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1).as applied to claim 1 above and further in view of Nettelbladt et al. (USPN 5,543,638).

11. In reference to claim 4, Chang does not disclose that the thickness of the InGaN well layer is 1 nm or greater and 2 nm or smaller. However Nettelbladt et al. (USPN 5,543,638, hereinafter referred to as the "Nettelbladt" reference) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelbladt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 4 is not patentable over Chang, Sakai, Edmond, and Nettelbladt.

12. With regard to claim 5, Chang does not disclose that the thickness of the well layer is between 1.3 nm and 1.8 nm. However Nettelbladt (USPN 5,543,638) discloses

that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelbladt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 5 is not patentable over Chang, Sakai, Edmond, and Nettelbladt.

13. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1 in view of Sakai et al. (USPN 4,992,837) and further in view of Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1).

14. In reference to claim 9, Chang et al. (USPN 6,441,403 B1) discloses a similar structure which meets the claim. Chang discloses (claims 1, 7, 13, and 19: columns 6-8) a gallium nitride (GaN)-based compound semiconductor device having a GaN-based light emitting member with a buffer layer adjacent to a light emitting layer member which comprises a multilayer quantum well layer structure including an InGaN well layer and an AlInGaN barrier layer. Chang does not disclose the use of a strained layer superlattice clad layer. However the use of such a layer is well known in the art. Sakai (USPN 4,992,837) discloses that a strained layer superlattice clad layer provides the benefits of proper lattice matching, excellent carrier confinement, and easy control of conductivity type (column 7, lines 7-11) which are all known goals in the art (column 2,

lines 10-15). In view of Sakai, it would therefore be obvious to use a strained layer superlattice clad layer in the Chang device. Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1) discloses that adjusting the content of aluminum and indium in a group III nitride material in order to attain a desired bandgap is known in the art (p. 2, paragraph 25). Furthermore Edmond discloses that the wavelength of emitted light is function of the bandgap of the material (p. 1, paragraph 6). Thus Edmond makes it clear that the content of aluminum and indium in a group III nitride layer as well is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore this limitation is not patentably distinguishable over Chang, Sakai, and Edmond. As for the specific wavelength range required by the applicant, McIntosh (USPN 5,684,309) makes it clear that the aluminum indium gallium nitride material system (the material system in Chang) possesses energy bandgaps which can be tailored over wavelengths which range from the far ultraviolet to the red region of the electromagnetic spectrum (column 2, lines 7-13). It has been held that:

> "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Thus claim 9 is not patentable over Chang, Sakai, and Edmond.

15. With regard to claim 10, Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Edmond (United States Patent Application Publication No. US 2002/0093020 A1) discloses that adjusting the content of aluminum and indium in a group III nitride material in order to attain a desired bandgap is known in the art (p. 2, paragraph 25). Furthermore Edmond discloses that the wavelength of emitted light is function of the bandgap of the material (p. 1, paragraph 6). Thus Edmond makes it clear that the content of aluminum and indium in a group III nitride layer as well is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore this limitation is not patentably distinguishable over Chang, Sakai, and Edmond.

16. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Sakai et al. (USPN 4,992,837) and further in view of Edmond et al. (United States Patent Application Publication No. US 2002/0093020 A1) as applied to claim 1 above and further in view of Yanamoto (United States Patent Application Publication No. US 2003/0047744 A1).

17. In reference to claims 14 and 15, Chang, Sakai, and Edmond do not disclose the use of alternating AlGaN and GaN superlattice clad layers (n-type or p-type). However Yanamoto (United States Patent Application Publication No. US 2003/0047744 A1)

disclose that these SLS clad material layers are well known in the art (p. 6, paragraphs 70-72, 81-83). The applicant is reminded in this regard that it has been held that a mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. See *In re Leshin* 227 F.2d 197, 125 USPQ 416 (CCPA 1960) and also *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore claims 14 and 15 are not patentable over Chang, Sakai, Edmond, and Yanamoto.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin Quinto/
Examiner, Art Unit 2826

/Evan Pert/
Primary Examiner, Art Unit 2826